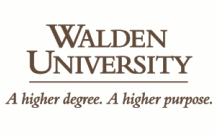

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The Relationships Among Kindergarten Entrance Age, Preschool Experience, and Reading Achievement

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This is to certify that the doctoral dissertation by

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has been found to be complete and satisfactory in all respects,
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Abstract

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by

Courtney Lynne Kowalczyk

MA, Walden University, 2013

MEd, Grand Valley State University, 2006

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Clinical Psychology

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Abstract

Children participating in kindergarten programming across the United States are expected to perform at a higher level than ever before. Many of these children are unprepared and developmentally unready for the academic tasks that await them. Researchers have shown that an older age at the start of kindergarten is a predictor of academic achievement. Researchers have also shown that prior preschool experience impacts academic achievement. What has been unknown though is how the relationship between both beginning kindergarten at an older age and attending preschool prior to beginning kindergarten impacts academic success. Using Piaget's theory of development as a foundation, this study examined the relationships among age at the start of kindergarten, prior preschool experience, and academic achievement. A quantitative quasiexperimental methodology was used with ex post facto data. Data from the Early Childhood Longitudinal Study were analyzed using a 2-way ANOVA to assess the strength of the effects of the variables. Results indicated that children who were 6 years of age at the start of kindergarten outperformed their younger peers on 3rd grade reading achievement assessment. Preschool experience was found to not impact reading achievement, nor did it moderate the relationship between age at the start of kindergarten and 3rd graders' reading achievement. These results support the notion that social change can come about through the dissemination of this research to parents and early childhood educators and provide assistance in making decisions about when children are ready for school.

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Dedication

My interest in this topic first began while I was working as a special education teacher in our local public school system many years ago. I taught many young children who were just not developmentally ready for all of the expectations that school demanded of them. In my new profession as a psychologist who works predominantly with young children with special needs, I continue to see more and more young children who are not prepared to enter school when their age dictates that they do. This dissertation is dedicated to all young children entering kindergarten in the United States. This dissertation is also dedicated to my own young children in hopes that what I learn through this process can benefit them as they enter into school.

Acknowledgments

To my husband Mark, thank you so much for your patience, love, understanding, and support throughout this educational endeavor. I could not have done it without you!

To my children Joshua and Jacob, thank you for your unconditional love. I hope that you both find an area that sparks your interests and that you pursue those interests until your heart's content.

To my colleagues Nicole, Erin, Michelle, Salina, and Jamie, thank you for your knowledge, encouragement, and support throughout this experience. I would not be where I am today without you!

To Dr. Arcella Trimble, Dr. Brian Ragsdale, Dr. Kelly Davis, and Dr. Jessica Hart, thank you for your knowledge and support throughout this process. I am eternally grateful for your patience and persistence in helping me accomplish my dreams.

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Chapter 1: Introduction to the Study

Introduction

The academic demands placed on young children entering school today are more intensive than in the past (Gullo & Hughes, 2011). Kindergarteners are under pressure to meet very high expectations and are being held to standards that were once established for first graders. Kindergarten academic content in the United States is rigorous and consists of standards across subjects, with a strong emphasis in the area of literacy. These standards have replaced developmentally focused activities such as structured play (Miller & Almon, 2009). Young children grow, develop, and change at a significant rate during their first few years of life and learning does not always happen at the same rate for every child (Centers for Disease Control and Prevention, 2013). According to Miller and Almon (2009), requiring children to meet these rigorous academic standards is causing a crisis within kindergarten classrooms across the country.

The National Association for the Education of Young Children (2009), in its statement on developmentally appropriate practices, indicated that the United States educational system has not considered the importance of childhood development in kindergarten environments. They proposed that too much time is currently being spent on superficial learning objectives and standardized testing and not enough attention is being given to children's age and stage of development, which is resulting in frustration for both children and teachers.

Many of the recent changes in kindergarten programming are a result of the No Child Left Behind Act (National Association for the Education of Young Children,

2009). This federal law was created to hold educators accountable for closing the achievement gap within educational environments (National Association for the Education of Young Children, 2009). One of the goals of this law was to improve the academic progress of U.S. students, which has been stagnant in relation to other nations.

Many countries worldwide provide education to their children differently than the United States. Many European and Asian countries strongly emphasize preschool programming and do not start formal education for children until they are older (Hancock, 2011; Economist Intelligence Unit, 2012). Children in Finland, for example, do not start preschool programming until the age of 6 years, and formal education begins at age 7 years. Finnish schools also provide preschool programming for all children. This is because of the belief that children will develop at their own rate and when they are ready to learn, they will be able to learn more effectively and efficiently (Ojala & Talts, 2007).

Research over the past few decades has indicated that children who begin kindergarten in the United States at an older age (age 6 years) tend to do better academically than children who start at a younger age (age 5 years). Specifically, Lubotsky and Kaestner (2016) found that children who enter kindergarten at an older age tend to do better on language arts and mathematical assessments than younger kindergarteners. Gullo (2014) found that children who began school at age 6 years performed better on academic achievement tests later on in school than children who started school at age 5 years.

Research studies over the past decade have also indicated that children tend to do better academically when then have had preschool experience prior to the start of kindergarten. Children are not required to attend preschool in the United States, but research supports its efficacy. For example, Bassok (2010) found that African American children living above the poverty level have stronger academic achievement when they have preschool experiences in comparison to those who do not attend preschool prior to starting kindergarten. Slaby, Loucks, and Stelwagon (2005) found that children of poverty who attended preschool programming outperformed children with similar socioeconomic status in second and third grade.

Reading and literacy development are predominant areas of instruction in preschool and kindergarten classrooms. At this stage of learning, children are beginning to learn letter names and sounds, and are beginning to sound out and read words (Department of Defense Education Activity, 2012). The ability to read is a necessary foundation for children to expand their learning into other areas. Significant emphasis has been given to the area of reading not only through federal law, but also through the common core standards, which are teaching standards that are being adopted across the United States to support national standards in this area and better prepare students to succeed in college, careers, and life (Kosanovich & Verhagen, 2012). As such, it is important to ascertain if there is a relationship between reading achievement, a child's age at the start of kindergarten, and prior preschool experience.

The United States has seen a tremendous shift in the education of children in kindergarten in recent years. Even though the intentions behind this shift were to boost

academic achievement, it seems that the changes have also lead to pressure, frustration, and a lack of emphasis on child development. Given that other leading nations in the academic domain provide education to their students in vastly different ways, it is possible that the developmentally focused strategies they are using could be applicable to our educational system to improve achievement, particularly in reading, and reduce frustration.

Problem Statement

Young children and their teachers across the United States have been feeling the pressure of higher academic demands (Stipek, 2006). While some children come to school ready to learn, others do not have the basic fundamental knowledge needed to learn, nor are they developmentally ready for academics like reading (Stipek, 2006). Countries around the globe whose students continue to achieve academically far greater than those in the United States utilize development-focused modalities. Not only do they start children in formal education at a later age, they also require that children participate in preschool programming. Given that literacy instruction is a primary emphasis in kindergarten education, reading achievement was used as a benchmark for this study. The general problem for this study was that children participating in kindergarten programming in the United States are being held to academic standards that were previously set for older children. The specific problem was that it was not known whether there are statistically significant differences in children's reading achievement scores between those who begin kindergarten at an older age and those who begin

kindergarten at a younger age, and whether the prior preschool experience these children had are associated with any potential differences in achievement scores.

Purpose of the Study

The purpose of this quantitative study was to assess if statistically significant differences exist in the reading achievement scores of children who began kindergarten at an older age and those who began kindergarten at a younger age. Further analysis also examined whether the prior preschool experience both groups of children had were associated with reading achievement levels. This study was quantitative in nature and included the following independent variables: age at the start of kindergarten and preschool experience. The dependent variable was reading achievement at third grade.

Research Question and Hypotheses

This research was undertaken to address the following research questions and the related hypotheses:

Research Question 1: Are there statistically significant differences in third graders' reading achievement scores by their age at the start of kindergarten?

$H_0$1: There are not statistically significant differences in third graders' reading achievement scores by their age at the start of kindergarten.

H_A1: There are statistically significant differences in third graders' reading achievement scores by their age at the start of kindergarten.

Research Question 2: Are there statistically significant differences in third graders' reading achievement scores by having prior preschool experience?

$H_0$2: There are not statistically significant differences in third graders' reading achievement scores by having prior preschool experience.

H_A2: There are statistically significant differences in third graders' reading achievement scores by having prior preschool experience.

Research Question 3: Does preschool experience significantly moderate the relationship between age at the start of kindergarten and third graders' reading achievement scores?

$H_0$3: Preschool experience does not significantly moderate the relationship between age at the start of kindergarten and third graders' reading achievement scores.

H_A3: Preschool experience significantly moderates the relationship between age at the start of kindergarten and third graders' reading achievement scores.

Theoretical Framework

Jean Piaget's theory of cognitive development was the underlying theory for this research project. Specifically, his stages of development were used as a premise for how children develop, learn, and demonstrate readiness for school in this study.

Jean Piaget believed that young children progress through developmental stages as they grow and develop (Piaget, 1964). His cognitive theory of development is centered on the notion that children act as little scientists and explore their own worlds. Children's cognitive development therefore matures out of the experiences they have within their environments. When a child encounters a situation that does not fit with previous experiences, then cognitive restructuring occurs allowing for the child to develop a further understanding and more complex cognition.

Piaget (1964) believed that children progress through four stages of development. The first stage, the sensorimotor stage, typically occurs between the ages of birth through the acquisition of language. During this stage infants develop an understanding of their world by coordinating experiences with physical interactions with objects. Children at this stage learn that they are separate from their environment and the notion of object permanence develops. By the end of this stage, children have learned to identify themselves from objects.

Piaget's second stage of development is the preoperational stage, which occurs from the time children develop language until around age 7 years (Piaget, 1964). During this stage of development, children learn through pretend play. They develop imaginative skills during this time along with symbolic play. Children struggle with understanding others' perspectives during this stage along with logic and manipulating information they attain.

Piaget's third stage of development is the concrete operational stage (Piaget, 1964). This stage usually occurs between 7 and 11 years of age. It is during this stage that children develop logic skills. Their thought processes mature and they begin to develop problem-solving skills. Given the complex maturity in thinking skills, it is during the concrete operational stage that Piaget believed children were ready for the school environment.

The fourth and final stage of development is the formal operational stage (Piaget, 1964). This stage typically begins around age 11 years and ends around the conclusion of

the teen years. Children during this stage of development attain complex thinking skills. They develop thorough abstract thinking skills, metacognition, and reasoning skills.

Jean Piaget believed that children grow and develop at different rates, but that all children would progress through his stages of cognitive development (Piaget, 1964). He believed that a child's current stage of development should be a guide for their learning. Children in the pre-operational stage of development learn through play, and therefore, we can ascertain that Piaget would strongly oppose the removal of play and developmental practices from kindergarten classrooms. Given that Piaget believed that children do not typically begin to develop more complex processing and problem-solving skills until between ages 7 and 11 years, we can also ascertain that he would support starting formal education at a later age.

Nature of the Study

This quantitative study used a quasiexperimental design with an ex post facto approach. The quantitative, quasiexperimental design was selected because of the need to examine differences in reading achievement scores between predetermined groups. This quantitative study included the following variables: age at the entrance of kindergarten, preschool experience, and reading achievement in third grade. For this study I used ex post facto data from the Early Childhood Longitudinal Study (United States): Kindergarten Class of 1998-1999, Kindergarten-8th Grade Sample. The data can be found at the following link: http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/28023. This data set includes data from a national longitudinal study that began in 1998. Children who participated in this study began kindergarten in the 1998-1999 school year.

The first portion of data from the kindergarten through eighth grade sample was published in 2011, with additional data being added in 2013 and 2014. The kindergarten through eighth grade data set provides information on student performance from kindergarten through eighth grade.

The data collected from the Early Childhood Longitudinal Study were uploaded into SPSS version 23.0 for Windows. Descriptive statistics were used to examine trends in the variables of interest. To address the three research questions for the study, a two-way ANOVA was used to assess the connections between student age at the start of kindergarten, preschool experience, and reading achievement in third grade.

Definition of Terms

The following terms and definitions were used throughout this dissertation:

Age at the start of kindergarten: The age of the child on their first day of kindergarten (The National Institute of Child Health and Human Development Early Child Care Research Network, 2007).

Preschool experience: Any formal school-related experiences that a child engages in prior to starting school. This may include traditional preschool, nursery school, Head Start, and other public or private formal early education programs (Bassok, 2010).

Reading achievement: The level at which a child is able to successfully read language. These levels are based on a comparison of children's performance at the same age and grade level expectations (Bingham & Patton-Terry, 2014).

Object permanence: The understanding that objects still exist even when they cannot be seen, touched, or sensed in any way (Piaget, 1964).

Metacognition: The ability to be aware of one's own thinking (Piaget, 1964).

Assimilation: Assimilation is the process in which new information is fit into pre-existing information that an individual already has (Piaget, 1964).

Accommodation: is the process that is used when new information forces an individual to modify their own thinking (Piaget, 1964).

Adaptation: Adaptation or equilibration occurs as a balance between assimilation and accommodation and is the driving force behind an individual's progress through the developmental stages (Flavell, 1966).

Assumptions

Assumptions are particular aspects of the study that the researcher believes to be true (Tabachnick & Fidell, 2012). It was assumed that the data were accurately entered from the parent questionnaires into the archival database. It was also assumed that parents provided accurate responses for their children, such as receiving prior preschool experience. Given that their developmental processes varied significantly, an inherent assumption for this research was that children may be more academically successful if given more time to grow and mature prior to beginning school. In other parts of the world, children do not begin formal education until age 7 years. These parts of the world tend to be leaders regarding educational performance and often have less need for special education. Given that this process works well for other children around the world, I assumed that it could also work here in the United States.

Scope and Delimitations

The scope, or delimitations, of the study are specific parameters that the researcher has set to narrow the study (Tabachnick & Fidell, 2012). This study aimed to address the relationship, if any, between age at the start and kindergarten, preschool experience, and academic achievement in school. Specifically, the study addressed these questions using a nationwide cohort. The use of secondary data is a delimitation for the study and will prevent extrapolation of the data to the greater population. Because a random sample was not utilized, the data may not be representative of the entire population of interest. In addition, through use of a quantitative study the researcher had a level of statistical confidence that significant findings did not occur by chance alone. However, a qualitative examination of teachers could provide a more in depth assessment for underlying reasons for differences in reading scores. The researcher decided to substitute the richness of interview responses for a degree of statistical certainty that significant findings did not occur by pure chance.

Limitations of the Study

Limitations are aspects of the study that the researcher has no control over (Tabachnick & Fidell, 2012). There are confounding variables that could affect the strength of the hypothesized relationships. It was expected that the population used in this study had a wide variety of preschool experiences. The amount of preschool experience could cause variation in reading levels by the time students reach the third grade. In addition, factors such as socioeconomic status or ethnicity could be confounding variables that impact the relationships. The researcher used demographic

information included from the parent interview such as child's gender, date of birth, and race along with the amount of preschool experience that the child's parent(s) indicated they participated in prior to the start of kindergarten to examine these potential confounds. Additionally, when the data were originally inputted, there may have been reporting or transcription errors that could have affected the data analyses. There are limitations in not knowing the exact procedures that were used to collect the data and there are population differences that could be difficult to control for. Due to the data being collected for these students approximately twenty years ago, there were also limitations in generalizing the findings to current elementary school students.

Significance of the Study

The goal of this study was to determine the relationship, if any, between age at the start of kindergarten, preschool experience, and reading achievement. Kindergarteners and teachers alike in the United States are facing significant frustration with higher academic demands and the reduction of developmentally appropriate practices. Research has shown that starting children in formal education at a younger age has no long-term benefit and may be detrimental to a child's learning overall (O'Connor & Angus, 2014). Research has also identified that children who begin school at a younger age are more likely to repeat a grade (Lincove & Painter, 2006). Of those students who have to repeat a grade, a significant number of them are more likely to drop out of school than the general population (Lincove & Painter, 2006). Starting school at an older age not only reduces frustration, but also has been shown to more effectively support a child's learning potential and increase their enjoyment of school (O'Connor & Angus, 2014). The results

of this study provided a more in-depth understanding of how children's reading performance is related to their age and previous preschool experience. If preschool experience and age are found to be good predictors of reading performance, then this information can be disseminated to parents and teachers alike to assist them in making early childhood programming decisions to best support reading achievement success and reduce frustration in students.

Summary

Children around the world seem to follow similar developmental phases during the first few years of their lives. Developmental theorists have found that children grow and develop at very different rates during the first few years of their lives. However, in the United States, children participating in kindergarten programming are being held to academic standards that were previously set for older children. Due to this, many children are having a hard time succeeding academically. The purpose of this quantitative quasiexperimental study was to assess if statistically significant differences exist in the reading achievement scores of children who begin kindergarten at an older age and those who begin kindergarten at a younger age. Chapter 2 will include a comprehensive examination of all the current literature relevant to this study.

Chapter 2: Literature Review

Introduction

Young children and educators across the United States are being held to increasingly high academic demands for student achievement (Eslinger, 2014; Stipek, 2006). While some children are ready for these high demands when they enter school, others do not have the basic fundamental knowledge needed to learn, nor are they developmentally ready for academic content (Centers for Disease Control and Prevention, 2013; Stipek, 2006). Countries around the globe whose students continue to academically achieve far greater than those in the United States utilize development-focused modalities. In more developmentally focused countries, children start their formal education at a later age after they have participated in preschool programming (Doyle, 2016).

One important academic area in early elementary programming is reading. Children are now expected to learn to read in kindergarten, which many children are not prepared for when they enter school. The general problem for this study was that children participating in kindergarten programming in the United States are experiencing stress due to the increase in academic standards in kindergarten programming that were previously set for older children. The specific problem was that it was not known if there are statistically significant differences in third graders' reading achievement scores by their age at the start of kindergarten and by having prior preschool experience.

The purpose of this quasi-experimental quantitative research design following an ex post facto approach was to assess if statistically significant differences exist in the

reading achievement scores of children who begin kindergarten at an older age and those who begin kindergarten at a younger age. Further analysis also examined the relationship, if any, between the amount of preschool experience both of these groups of children had and reading achievement levels. This study included the following independent variables: age at the start of kindergarten and preschool experience. The dependent variable was reading achievement at the third grade level.

This chapter introduces and provides an understanding of the effects that preschool experience and school entrance age can have on academic achievement. This chapter begins with an analysis of Piaget's theory of development and its implications for education. Background information is then provided on the educational process in the United States and how new reform is creating higher academic performance demands for young children. School entrance age and its implications for performance is then discussed. Following this, the effects that preschool experience has on academic performance are then discussed. Next, information on how other countries around the world educate their students is reviewed. Literacy performance is then reviewed, followed lastly by an examination of other research that has been conducted using The Early Longitudinal Study: Kindergarten Class of 1998-99 data.

Literature Search Strategy

To prepare this chapter, a literature review was conducted by utilizing databases such as ERIC, PsycArticles, PsycINFO, and Google Scholar via the Walden University website. The search resulted in classic and current research articles from peer-reviewed journals, books, and national newspapers on the following key terms: *academic*

achievement, school readiness, school entrance age, preschool experience, literacy, and early childhood education. Additionally, previous studies utilizing The Early Childhood Longitudinal Study: Kindergarten Class of 1998-99 data were reviewed for their methodology and outcomes. Piaget's theoretical model of child development was also examined. The background information contained within this chapter provided understanding and support for this research study.

Theoretical Foundation

Jean Piaget's theory of cognitive development is one of the most prominent theories of childhood development even today. Piaget believed learning takes place in stages and through the processes of assimilation, accommodation, and adaptation within a child's environment (Hergenhahn, 1982; Maier, 1969). Assimilation is the process in which new information is fit into pre-existing information that an individual already has, and accommodation is the process that is used when new information forces an individual to modify their own thinking. Adaptation or equilibration occurs as a balance between assimilation and accommodation and is the driving force behind an individual's progress through the developmental stages (Flavell, 1966).

Jean Piaget (1964) believed that young children progress through developmental stages as they grow and develop. His cognitive development theory was centered on the notion that children act as little scientists and explore their own worlds. Children's cognitive development therefore matures out of the experiences they have within their environments. When a child encounters a situation that does not fit with previous experiences, then cognitive restructuring occurs allowing for the child to develop further

and deeper understanding of the concepts at hand and thus more complex cognition develops.

Piaget (1964) also asserted that children progress through four stages of development. The four stages are the sensorimotor stage, the pre-operational stage, the concrete operational stage, and the formal operation stage.

1. The sensorimotor stage starts at birth and continues through the acquisition of language. At this stage, children learn that they are separate from their environment and they develop the concept of object permanence. By the end of this stage, children are able to identify themselves from objects.
2. The pre-operational stage begins when children develop language and lasts until around age 7 years (Piaget, 1964). It typically coincides with the time when children attend preschool and kindergarten. During this stage of development, children learn through pretend play. They develop their own sense of imagination and use symbolic play. Children at this stage struggle with understanding others' perspectives. Understanding logic and manipulating information they attain can also be challenging.
3. The concrete operational stage begins around age 7 years and lasts through age 11 years, which typically coincides with elementary school aged children. It is during this stage that children's thought processes mature and they develop logic and problem solving skills. Piaget believed that

children were ready for the school environment once they entered into the concrete operational stage due to the maturity in their thinking.

4. The formal operational stage typically begins around age 11 years and ends around the conclusion of the teen years (Piaget, 1964). This stage of development typically coincides with middle and high school aged students. Children during this stage of development attain complex thinking skills. They develop thorough abstract thinking skills, metacognition, and reasoning skills.

Piaget believed that children moved through his stages of development as they age. He believed that each child was unique and would progress through each stage at their own pace (Piaget, 1964). Piaget identified four main factors that he believed contributed to a child's developmental progress through his stages (Flavell, 1966). The first main factor is maturation, which Piaget described as both the physical and neural growth within the child (Flavell, 1966). He highlighted that as children grow and develop, they physically become larger and they have greater neural activity within the brain. As this maturation occurs, they are better able to learn and utilize more complex concepts and processes. The second main factor is social transmission, which Piaget indicated was the knowledge that children attain through interaction with all people including other children and adults within their environment (Flavell, 1966). Piaget found that young children learn through their own play, both individually and with others. The more opportunities children have to engage with each other and with adults, the further their knowledge base and social skills would develop. The third main factor is

experience (Flavell, 1966). Piaget believed that children increase their knowledge by acting on objects and engaging in social experiences within their environment. Thus, hands-on learning experiences were important for children as they developed. The fourth and final factor is equilibration, which is the knowledge that is formed through the processes of assimilation and accommodation (Flavell, 1966). Piaget noted that children form new knowledge once they have completed the processes of assimilation and accommodation. Piaget believed these factors contributed to a child's progress through the developmental stages and had significant implications for the education process.

Piaget suggested that children's thinking develops from the concrete to the abstract (Maier, 1969). For example, in early childhood children are constantly investigating their world. Their primary method of learning is through their interaction with their environment and through play. As they move into the next phase, the pre-operational stage (ages 4-7 years), children begin to show an interest in social interactions and experiences. They think more in pieces rather than in the whole, and although they can count, number concepts are not typically understood. Children at this stage engage in self-conversation and usually follow instructions from adults. This is the stage in which Piaget's work suggested preschool experiences would be helpful for children (Tyler, 2012). A preschool teacher's role at this stage is to facilitate growth and understanding through guiding children through hands-on experiences. Collaboration and cooperation are important aspects of the preschool environment and teachers help guide their students through the process of resolving conflict rather than on fixing the problem themselves (Tyler, 2012).

In the concrete operational stage that follows (ages 7-11 years), children begin to understand relationships such as part-to-whole. They can utilize early conceptualizing and classifying concepts and can shift from inductive to deductive thinking. Children at this stage can begin applying their own knowledge to new learning (Piaget, 1964). Although the thought processes of the 7–11 year-olds are more advanced, they still are related to real objects rather than the abstract (Hergenhahn, 1982; Piaget, 1970). It is during this stage of development that Piaget believed children were ready to learn academic content like reading and mathematics (Piaget, 1964). Finally, when children reach the age of 11 or 12 years old they begin to develop hypothetical and abstract thinking.

Piaget believed that children grow and develop at different rates, but they follow a pattern as he outlined in his stages of cognitive development (Piaget, 1964). He stated that children would progress through his stages of cognitive development as they grow and have continued experiences with others and their environment. Piaget believed that a child's current stage of development should be a guide for their learning. Children in the pre-operational stage of development (ages 4-7 years) learn through play. As such, Piaget's theory is inconsistent with the removal of play because children do not typically begin to develop more complex processing and problem-solving skills until the ages of 7 through 11 years. We can also ascertain that he would support starting formal education closer to the age of 7 years, thus allowing children more time to learn through play and interactions with others before shifting the focus of learning to academic content. Piaget would have agreed that children who are still within the pre-operational stage of

development are not ready for the rigorous academic content that kindergarteners are currently expected to learn. Piaget would contend that young children are not prepared for the rigorous academic standards that are now in place in kindergarten classrooms because they are not at a developmental level where they would be able to utilize, process, and understand the information they are learning. They are simply not developmentally ready for the content. Thus, consistent with the tenets of Piaget's theory, this study investigated whether children who begin kindergarten at an older age and who have had more developmental experiences through the preschool environment are better prepared for the academic rigor that awaits them in kindergarten.

Kindergarten in the United States

Kindergarten first originated in Germany in 1837 by a German educator named Friedrich Froebel (Froebel, 1974). Froebel believed that children were like plants and teachers were like gardeners, therefore kindergarten or *children's garden* was born. Froebel's kindergarten was focused on the whole child. He strongly emphasized play in his program which began very simplistically, but became more complex as children progressed (Froebel, 1974). Froebel believed that children should learn through play. He developed three principles for education in kindergarten that include social imitation, learning through expression, and systematized play (Froebel, 1967b).

Froebel's kindergarten programming began to branch out to other countries in the late 1840s. In 1848, Carl Schurz and his wife Margaretha Meyer Schurz immigrated to Wisconsin, bringing with them Mrs. Schurz's training and experience (Headley, 1965). Prior to the move, Mrs. Schurz had studied under Froebel. She opened a German

speaking kindergarten in her home in 1855 where she put into practice Froebel's teaching with her children and other family members (Weber, 1969).

In 1859, Elizabeth Peabody became interested in Mrs. Schurz's kindergarten program. After meeting with Mrs. Schurz, Elizabeth Peabody opened the first English speaking kindergarten in Boston, Massachusetts (Ross, 1976). She went on to further study Froebel's work and eventually went to Germany herself to study his practices.

In the late 1800s and early 1900s, the industrialization movement expanded in the United States. Many mothers were forced to join the workforce resulting in the need for care for their young children (Ross, 1976). While some children attended day nurseries, which focused on child rearing practices, other children attended kindergarten. By the early 1900s, the kindergarten movement had become very progressive. Free kindergartens for children ages 3 to 7 years were readily available and were viewed as community centers for the neighborhood (Ross, 1976).

By 1914, every major city in the United States had established public kindergartens. The curriculum began to change around this time though to include new subjects of study. In the 1920s, new psychological theories began to emerge in the United States. Behaviorism was taking shape, and teachers were no longer encouraged to give love and affection in the classroom (Shapiro, 1983). Behaviorists noted that education should be based on learning objectives and habit formation. At the same time, Dewey's social education theory was also taking shape. Dewey believed that education was a learning experience that occurred through a social and interactive process (Shapiro, 1983). He believed that students performed best when they could experience and interact

with the curriculum firsthand. Although Dewey's social theory of education was more similar to Froebel's original vision for kindergarten, behaviorism eventually took over and became the main focus of education.

By the early 1950s, kindergarten was integrated into public schools. Policy changes took hold and children only between the ages of 4 and 5 years could participate in kindergarten programming (Weber, 1969). Complaints about the United States education system also began to surface and kindergarten teachers were forced to accelerate academic skills in kindergarten curriculum (Shapiro, 1983). This change led to the failure of children from uneducated and poor socioeconomic backgrounds (Rudolph & Cohen, 1984). To support these children, additional kindergarten programs were opened in low socioeconomic areas to close the achievement gap.

As the 1960s came, so did the theory of Jean Piaget. Piaget believed that children developmentally progress through stages at their own rate (Mindess & Mindess, 1972). He stressed the importance of play, socialization, and a hands-on approach to learning. Thus, kindergarten curricula and approaches transformed yet again. During this period, children in kindergarten programming spent a majority of their time manipulating objects and playing out situations and new concepts they were learning (Mindess & Mindess, 1972). Students spent a majority of their time learning by sitting on the ground and interacting with their world, and very little at a desk with pen and paper in hand.

During the 1970s, parents began to push for more rigorous academic programming in kindergarten classrooms (Headley, 1965). Reading, writing, and arithmetic were important for many parents. Thus, the *Hurry-Hurry-Hurry* theory of

education was born, increasing pressure on kindergarten students to learn and achieve more, causing increased stress levels (Headley, 1965). Formal research in the 1970s confirmed that kindergarten experiences were correlated with academic success in later years (Mindess & Keliher, 1967; Mindess & Mindess, 1972). The age requirement for kindergarten also became a topic for debate as older students were outperforming younger students academically in kindergarten programming (Mindess & Keliher, 1967; Mindess & Mindess, 1972). By the late 1970s, many districts across the United States required that children begin kindergarten around age 5 years.

In the 1980s, the publication *A Nation at Risk* highlighted the decline in educational performance of students in the United States in comparison to other countries around the globe (U.S. Department of Education, 1983). This document highlighted concerns that the United States was losing intellectual capacity to other countries and a need for educational reform emerged. By the late 1980s, enrollment of 5 year olds in kindergarten programs had risen significantly across the United States (Morrison, 1998). A movement to transform kindergarten into a traditional first grade classroom began to take shape. As a result, researchers looked to school readiness and found that many children entering kindergarten at the time were ill suited for learning (Morrison, 1998). In 1994, as part of the Goals 2000: Educate America Act, specific attention was given to the need for children to be ready to learn when they entered school. This resulted in some states raising their school entrance age; however, a large majority of states still require children to start school at the age of 5 years (Morrison, 1998).

Children can participate in developmental and academic programming prior to starting formal schooling. This is often known as preschool programming. Due to the increased participation in preschool programs, addition of educational games, advances in technology, and exposure to educational television programs, children's academic knowledge is vastly different today than it was 20 years ago (Guhn, Milbrath, & Hertzman, 2016). Children enter school today with far more academic knowledge and skill than in previous years. Thus, the expectations of kindergarten have changed yet again. The current demands placed on kindergartners and the rigorous standards that are imposed were not as prominent in years past (Davoudzadeh, McTernan, & Grimm, 2015). The shift of former first grade curricula into the kindergarten classroom has become increasingly common (Sutter et al., 2016). Because of this shift in curriculum, many children are falling behind academically at the start of their school career (Peixoto et al., 2016). Additionally, the use of play in kindergarten classrooms continues to decline to make way for more rigorous academic demands, yet research in recent years has continued to document that children learn through play (Lynch, 2015).

Increased Academic Demands on School-Aged Students

Over time, the focus of kindergarten has shifted from developmental play to academic rigor (Pyle & Luce-Kapler, 2014). Kindergarten was originally envisioned as a place for children to play, socialize, and learn about their world through hands-on activities; however, these developmentally focused practices are being replaced by academic tasks. The academic requirements for children entering kindergarten in the United States today are rigorous (Gullo & Hughes, 2011). The kindergarten curriculum

has intensified academic components significantly, which leaves little or no time for developmentally focused tasks like play (Miller & Almon, 2009). The new rigorous requirements do not take into account the fact that young children grow, develop, and change at a significant rate during their first few years of life and that learning does not always happen at the same rate for every child (Centers for Disease Control and Prevention, 2013). This gap between where children are when they enter kindergarten and where they are expected to be has led to increasing amounts of pressure on kindergarten students and teachers alike (Miller & Almon, 2009). For example, Lynch (2015) conducted a netnographic study of 78 kindergarten teachers' responses to concerns about the lack of play in their classrooms. The results indicated that most of the kindergarten teachers who participated in the study reported feeling pressured by other teachers, principals, and school policies to focus on academic goals. Thus, they removed much of play time from their classrooms. However, most reported that this has not been helpful in improving the achievement of their students.

The National Association for the Education of Young Children (2009), in its statement on developmentally appropriate practices, declared that the United States educational system has lost sight of the importance of childhood development in kindergarten environments. The association suggested that too much time is currently being spent on superficial learning objectives and standardized testing and not enough attention is being given to children's age and stage of development, which is resulting in frustration for both children and teachers.

Many of the recent changes in kindergarten programming are a result of the No Child Left Behind Act (The National Association for the Education of Young Children, 2009). This federal law was created to hold educators accountable for closing the achievement gap within educational environments and evolved out of government policies and concerns in the late 1990s. School districts who do not meet the standards of the No Child Left Behind Act are subject to losing federal funding, which has led to increased stress for teachers and school district administrators alike (The National Association for the Education of Young Children, 2009). One of the goals of this law was to increase overall student achievement in the United States so that students are more comparable to students from other countries who are leading the way in academic achievement. Even though the kindergarten classroom is not directly impacted by the No Child Left Behind Act, its effects have still taken hold of kindergarten classrooms (Lynch, 2015). The most notable effect has been the reduced emphasis on play-based activities to make way for further academic content and prepare children to do well on standardized tests (Copple & Bredekamp, 2009).

Since the late 1990s, kindergarten programming has seen a vast shift in federal standards, curriculum, and overall instruction. Developmentally focused tasks like play have been removed from kindergarten classrooms and have been replaced by rigorous academic demands. While all of these changes were meant to improve overall academic achievement, they have also lead to stress for teachers and kindergarten students alike. Given that children enter school in such vastly different places socially, academically,

and emotionally, many are not developmentally ready for the demands that will be placed on them.

Age at Entrance of Kindergarten

The optimal age for children to enter kindergarten has been a source of debate since the 1930s (Bigelow, 1934; Konarzewski, 2014). Research has found over time that children who begin school at a later age typically perform better academically than their younger peers. For example, in the 1950s, a study was conducted to assess the academic achievement of sixth grade students (King, 1955). Students in the study who began school at an older age were found to outperform their younger peers (King, 1955). A more recent study found that children who are younger when they begin kindergarten tend to have greater difficulties with learning and adapting to school life than their older peers (Dobkin & Ferreira, 2009). Kindergarten and overall school entrance age have been researched for many decades and the vast amount of research supporting the notion that children perform better academically when they begin school at an older age was reviewed.

Age at the entrance of school in the United States has decreased over the past several decades (Deming & Dynarski, 2008). Children in the United States typically begin school between the ages of 4.5 years old to 6.5 years old (Coley, 2002). The typical United States kindergartener is 5.5 years old at the beginning of their kindergarten school year (Zill & West, 2001). Even though children in the United States typically begin school around the age of 5 years, it does not necessarily mean that they are ready for formal schooling. Researchers are concerned that we may not have reached the

optimal age for students to begin school (Lincove & Painter, 2006). Research over the past few decades has indicated that children who begin kindergarten in the United States at an older age tend to do better academically than children who start at a younger age. Specifically, Lubotsky and Kaestner (2016) found that children who enter kindergarten at an older age tend to do better on language arts and mathematical assessments than younger kindergarteners. Gullo (2014) also found that children who began school at age 6 years, performed better on academic achievement tests later than children who started school at age 5 years.

Even though the average age for students to begin kindergarten is age 5 years, requirements for a student's age to enter kindergarten vary by state across the United States. According to the National Association of Early Childhood Specialists in State Departs of Education (NAECS-SDE; 2000), many states in the United States have raised the required entrance age of kindergarten in recent years; however, variations in entrance age are ever present. In many states, the cut-off dates for school entry are now earlier in the calendar year than they previously were (National Association for the Education of Young Children [NAEYC], 1997b).

When a child reaches his or her fifth birthday it does not guarantee that he or she is ready to attend school, nor does it mean that he or she has the knowledge needed to meet the higher academic standards being set forth in kindergarten classrooms (Ilg, 1982). Classical research from Crnic and Lamberty (1994) found that age 5 years may not necessarily be the optimal age for school readiness. However, Smith and Shepard (1988) cautioned the age debate and stated when entry age is increased, access to public

education is delayed. Parents are then faced with continued childcare expenses or a reduction in one parent's ability to work for another year (Datar, 2006).

Crawford, Dearden, and Meghir (2007) assessed how age at school entrance is associated with student performance in the United Kingdom. They found that the youngest children within a grade (those students whose birthdays fell closest to the age cut-off date) typically score over half a standard deviation lower on academic testing than children whose birthday was furthest from the school cutoff (oldest students; Crawford et al., 2007). They further reported that these differences do decrease over time but can still be seen at age 16 years.

When children begin kindergarten at a young age, they appear to be at a disadvantage in comparison to their older peers. Students who are young for their grade level, especially in kindergarten, can exhibit difficulties with academic achievement and maturation (Lee & Burkam, 2002). Because of this, students who are young for their grade level have an increased likelihood of being retained (Willson & Hughes, 2006). Given these concerns about retention, academic achievement, and maturation, delaying the start of kindergarten, or *academic redshirting,* has become a popular strategy that parents are using to support better academic achievement in younger children (Pong, 2009). When students participate in academic redshirting, or when they have a delayed start to their academic career, researchers believe that this process will provide these students with one more year of development so that they are better able to manage the academic rigor of kindergarten (NICHD Early Childhood Care Research, 2007). Children who have been redshirted in kindergarten have been found to have higher

academic achievement outcomes, even in higher grades, although the gap was not as pronounced (Datar, 2006; Lin, Freeman, & Chu, 2009). Datar (2006) further stated that academic redshirting was found to accelerate the achievement of low socioeconomic students, disabled students, and boys.

When children begin formal schooling, they tend to differ in what they can and cannot do physically, cognitively, and emotionally (Malone, West, Flanagan, & Park, 2006). Age at the entrance of schooling is correlated with students' academic achievement. Huang and Invernizzi (2012) conducted a longitudinal study of 405 students from high-poverty low performing schools. Students were divided into two groups based on their age at the start of school. Students' academic performance was followed from kindergarten through second grade. The results of the study found that the participants who began school at age 5 years scored lower on academic performance measures than participants who began school at 5 years and 11 months of age. The gap in performance was found to lessen over time; however, a difference still remained at the end of second grade. This pattern of performance has been presented in several other research studies that also concluded that the performance of students who begin school at an older age is higher than the performance of students who begin school at a younger age (Oshima & Domaleski, 2006; Stipek, 2006).

Research over the past several decades has continued to support the notion that beginning school at an older age affects student performance in a positive manner. The scope of research in this domain continues to expand as more variables are investigated. Raffaele Mendez, Kim, Ferron, and Woods (2015) conducted a study of 6,841 students

who entered kindergarten in a single large school district in 1989. The researchers examined the long-term outcomes for children who experienced delayed entry to kindergarten in comparison to children who were retained in kindergarten. Student progress in these two groups was compared to the progress of typically progressing peers. The results of the study found that children who begin kindergarten at an older age are less likely to be at-risk for learning difficulties than children who begin kindergarten at age 5 and are then retained for a year. The retained group also was found to have poorer long-term outcomes including an increased likelihood of being retained in Grades 9-12, increased likelihood of special education enrollment, and difficulty with attention in Grade 3.

School Entrance Age Outside of the United States

Many countries worldwide provide education to their children in very different ways than in the United States. Many European and Asian countries strongly emphasize preschool programming and do not start formal education for children until they are older (Hancock, 2011; The Economist Intelligence Unit, 2012). Children in Finland, for example, do not start preschool programming until the age of 6 years. Finnish schools also provide preschool programming for all children. This is because of the belief that children will develop at their own rate and when they are ready to learn, they will be able to learn more effectively and efficiently (Ojala & Talts, 2007). Children in Croatia, and many other European countries, typically begin primary school between the ages of 6 years and 7 years. In a recent study, Burušić, Šakić, Babarović, and Dević (2013) found

that Croatian children who were older at the start of primary school were found to academically outperform their younger peers.

According to Horstschräer and Muehler (2014), most children in Germany begin school at the age of 6 years. Prior to beginning school, children must be evaluated by a pediatrician to determine whether or not they are ready to begin school. German physicians utilizing screening tools to assess children's social, motor, and cognitive skills (Horstschräer & Muehler, 2014). Data gained during these assessments help physicians determine whether they should recommend beginning school at age 6 years, or allow the child an additional year to develop. Horstschräer and Muehler examined the effects of age at the start of school on school performance and overall developmental outcomes and found that children who are older at the start of school tend to outperform those who are younger. Additionally, children in Nigeria begin school between the ages of 6 years and 7 years (Delprato & Sabates, 2015). Children entering school at these ages are found to perform better than children who enter before age 6 years or after age 8 years.

The age at which a child should begin school has been a source of debate for almost a century. Researchers have continually supported the notion that children who are older at the start of school outperform their younger peers. There is some debate as to how long older peers tend to outperform younger peers; however, the pattern remains consistent. Given the increased academic requirements in kindergarten programs today, it is likely that children who are of an older age when they begin school will be more developmentally prepared for the academic rigor they will experience in the kindergarten environment. However, children should not be overly delayed in beginning kindergarten

either. This study further examined the effects of age at the start of kindergarten and other variables on academic performance.

Early Childhood Programs

In Denmark, children attend preschool programming from ages 3 to 6 years, and then move on to formal schooling at age 7 years. Researchers have found that high quality preschool programs have a significant impact on children's cognitive development and these impacts can still be seen 10 years post preschool attendance (Bauchmüller, Gørtz, & Rasmussen, 2011).

In Eastern countries like China, preschool programming has been less common (Li, Lv, & Huntsinger, 2015). In recent years, a great push to include preschool programming in China's educational system has occurred. Researchers recently found that when Chinese children enter preschool at a younger age and stay there longer prior to the start of formal education, their academic success improves (Li et al., 2015).

Research studies regarding preschool in the United States over the past decade have also indicated that children tend to do better academically when then have had preschool experience prior to the start of kindergarten. Magnuson, Meyers, Ruhm, and Waldfogel (2004) found that children who attend center-based preschool programs in the year prior to kindergarten have higher scores on reading and math at kindergarten entry than children who did not attend preschool programs. This study also found that higher scores associated with center-based preschool programming continued through the end of first grade, and that preschool attendees were also less likely to be held back in kindergarten (Magnuson et al., 2004).

Early childhood programming as a whole has been found to have both short and long term associations with student performance and achievement. Not only does it support positive academic skill development, it also supports children's social, emotional, and cognitive development. The influences of early childhood programming have even been found to last well into adulthood. While early childhood programming was originally created in the United States to support children of low socioeconomic status, it has been shown to be helpful to children from many different backgrounds. As kindergarten programming moves towards more rigorous academic standards and the reduction of developmental practices, preschool programming has become even more important in helping children progress developmentally and increase the likelihood that they will be ready to begin formal kindergarten education.

Prior to beginning formal education, parents have the option to send their children to early childhood education programming. While the notion of providing developmentally appropriate opportunities for young children to learn and engage with their peers has been around for over a century, formal early childhood programming began in the United States in 1965. At that time, Head Start, the first publicly funded preschool program, was created by President Lyndon B. Johnson (Zigler & Valentine, 1979). This program was designed by the federal government to create half-day programming for young children from low-income families. Since its inception, Head Start has been found to be helpful for young children (Cooper & Lanza, 2014).

Head Start, along with programs like preschool and nursery school, are resoundingly popular today and can be accessed in most communities nationwide. The

goal of these programs is to provide children with opportunities to socialize with their same-aged peers. Play is heavily focused and educational content is developmental in nature (Copple & Bredekamp, 2009). The goal of early childhood education programming is to prepare children to enter school and to identify children who may be at risk for developmental or learning based difficulties so that further interventions can be utilized to support these students (Hatcher, Nuner, & Paulsel, 2012).

Current research has consistently found that high quality early care and education programs produce significant short- and long-term effects on children's cognitive, social, and emotional development (Barnett, 2011; Iruka & Morgan, 2014). The short term effects of high quality early care and education programs include improved academic performance and achievement (Votruba-Drzal, Coley, & Chase-Lansdale, 2004). While most research studies cite positive influences of early childhood programming, researchers point out that it is especially beneficial for children from low socioeconomic groups (Burchinal, Vandergrift, Pianta, & Mashburn, 2010; Sabol & Pianta, 2014). Longitudinal research has found that high quality early childhood programming can positively influence African American children from low socioeconomic backgrounds (Belfield, Nores, Barnett, & Schweinhart, 2006; Pungello et al., 2010). For example, Bassok (2010) found that African American children living above the poverty level have stronger academic achievement when they have preschool experiences in comparison to those who do not attend preschool prior to starting kindergarten. Slaby, Loucks, and Stelwagon (2005) found that children of poverty who attended preschool programming

outperformed children with similar socioeconomic status in second and third grade. The researchers furthered that some of these impacts can last well into adulthood.

Furlong and Quirk (2011) examined the effects of preschool experience on academic achievement in Hispanic children from low socioeconomic circumstances. They found that formal preschool experiences play an important role in preparing children for formal kindergarten programming. Preschool experiences strongly support kindergarten readiness. However, accessing preschool can be challenging for some children. Furlong and Quirk (2011) found that children from lower socioeconomic backgrounds were less likely to attend formal preschooling due to difficulties with transporting children to and from the preschool along with the cost of preschool. Children who come from higher socioeconomic backgrounds and whose parents are more highly educated are more likely to attend preschool (Sabol & Pianta, 2014).

Preschool is a place for children to learn through play. Research has shown that increased engagement in play activities has a positive influence on children's social, cognitive, motor, and linguistic skills (Eberle, 2011). Play has been found to be a valuable classroom activity and allows children to develop a wide range of social and academic skills (Copple & Bredekamp, 2009; Fisher et al., 2011). However, in recent years, we have seen a steady decline in the amount of time kindergarten classrooms have devoted to play (Brownson et al., 2010; Frost, 2008).

Literacy Development

Literacy, or the ability to read written language, is a developmental progression that children move through. The developmental foundations for reading begin very early

on, well before we would expect children to read written language (Browder, Courtade-Little, Wakeman, & Rickman, 2006). During infancy and toddlerhood, children begin focusing on pictures and stories that are read to them. They help turn the pages of books and often will attempt to recite preferred words or phrases that have been read to them (Browder et al., 2006). During the preschool phase, children learn that reading is actually something people engage in doing. They learn how to handle books, listen to stories, recite words or phrases from text, and even begin to show preferences for specific stories. Children make the connection that pictures and text in stories actually convey meaning. They begin to recognize familiar words and are able to make the connection that spoken language is inter-related to text (Browder et al., 2006). In early elementary school, children develop the awareness that words are made from different sounds. They learn how to decode simple words and begin to grow their sight word vocabulary. They also begin to write stories using pictures and short sentences (Browder et al., 2006). As children progress through elementary school, their reading skills also progress. Children continue to increase their vocabulary and their understanding of language becomes more complex. At this stage, children can read independently (Browder et al., 2006). As children move into secondary schooling, their reading continues to be more complex. They begin to read to acquire knowledge. They analyze and think critically about text that is presented (Browder et al., 2006). The development of reading skills, or literacy, is a developmental sequence much like Piaget's theory of development. Children do not move through these stages at the same time, and some move much more slowly than

others (Browder et al., 2006). These differences need to be taken into account as children enter kindergarten.

Reading and literacy development were not originally target areas of instruction in kindergarten programming in the United States; however, they are predominant areas of instruction today. At this stage of learning, children are beginning to learn letter names, sounds, and begin to sound out and read words (Department of Defense Education Activity, 2012). The ability to read is a necessary foundation for children to expand their learning into other areas. Significant emphasis is being given to the area of reading not only through federal law, but also through the common core standards, which are teaching standards that are being adopted across the United States to support national standards and better prepare students to succeed in college, careers, and life (Kosanovich & Verhagen, 2012). These standards are also meant to improve the academic progress of our nation's students, which has been stagnant in relation to other nations (Kosanovich & Verhagen, 2012).

Literacy is the primary academic focus in kindergarten and 1st grade. Children who begin school at a younger age have been found to perform poorer on literacy-based activities than children at older ages. For example, a study conducted in Ireland found that younger students performed lower on literacy assessments during their first, third, and fifth years of schooling than older students (Menet, Eakin, Stuart, & Rafferty, 2000). Stipek and Byler (2001) found that older students seem to have an advantage in academic literacy achievement in comparison to younger students. Jones and Mandeville (1990) assessed student reading performance in Grades 1, 2, 3, and 6 and found that younger

students were at a higher risk for failure than older students even when gender, race, and socioeconomic status were controlled. Sweetland and De Simone found similar findings in their 1987 study. They followed 150 students born in 1970 through Grade 6 in an upper middle class suburban school district. Sweetland and De Simone found that in Grades 2, 3, 4, and 6 younger students performed lower on reading assessments than their older peers. Cameron and Wilson (1990) also found that older students outperformed younger students on reading achievement assessments.

Early literacy experience and exposure in preschool has been shown to be a strong early predictor of school success (Bingham & Patton-Terry, 2013). Early reading programs utilized in preschool programming, specifically the Early Reading First program, were found to have a positive influence on African American children from low socioeconomic backgrounds (Bingham & Patton-Terry, 2013). The utilization of Early Reading First programs and exposure to literacy concepts in preschool were found to be helpful not only in overall literacy skill development, but also in oral language skills.

Teltsch and Breznitz (1988) indicated that older first graders scored higher in reading than younger first graders. The older students in this study performed better on vocabulary, had fewer reading errors, higher reading comprehension, and read more efficiently and at a quicker pace than younger students. Morrison, Griffith, and Alberts (1997) found that the oldest first grade students performed better than the youngest first graders in reading across the school year.

Literacy is connected to so much of what children experience every day. Learning to read not only allows children to understand and utilize language, but it also

supports the development of other skills (Browder et al., 2006). Reading and the ability to understand language is the foundation for many other academic skills including spelling, writing, and higher order thinking. Children who have developed strong reading skills tend to perform better in school and have a more positive self-image (Browder et al., 2006). They become lifelong learners, which is essential in today's world. Most reading materials published for the public are written at a third grade reading level. Thus, if students can be proficient at a third grade reading level, then they will be able to access and understand information presented in the world (Browder et al., 2006).

Given that literacy instruction has become the predominant academic focus in kindergarten classrooms, it was used to assess student performance in the current study. The researcher assumed that literacy performance would be higher for students who began school at an older age and for those who had preschool experience. Because most public utilized publications are written at a third grade reading level, reading achievement data in the third grade was utilized.

Early Childhood Longitudinal Study

The Early Childhood Longitudinal Study consisted of two different longitudinal studies that investigated children's development, their level of readiness for school, and their early experiences of school. Many researchers have previously used data from the Early Childhood Longitudinal Study to assess a multitude of variables. A couple of studies examined aspects like the current study. For example, Datar and Gottfried (2013) analyzed how kindergarten entry age is associated with social-behavioral outcomes utilizing data collected from the Early Childhood Longitudinal Study. They divided the

participants into three groups based on age (<5.0, 5.0-5.5, and >5.5 years of age). They found that children who begin school at age 6 years have significantly better social-behavioral outcomes during elementary school. However, these effects begin to disappear over time. Fleischman (2007) found that the youngest students, those who began school at an earlier age than expected, performed more poorly on mathematic assessments than their older peers. This group of students was also more likely to be retained during their elementary school years than their same aged peers.

Even though the Early Childhood Longitudinal Study has been used to assess some aspects of student age at the start of school, the current study is the only one that not only assessed the impacts of age, but also the influence of preschool experience on student achievement.

Summary

The United States has seen a tremendous shift in the education of children in kindergarten in recent years. Even though the intentions behind this shift were to boost academic achievement, the changes also lead to pressure, frustration, and a lack of emphasis on child development. As indicated in the review of the literature, the academic demands place on young children today in the United States are very high, and they are likely not developmentally ready for academic rigor when they begin school at age 5 years (Stipek, 2006). Research has indicated that children who start formal schooling in the United States at an older age tend to better perform academically in higher grade levels (The National Institute of Child Health and Human Development Early Child Care Research Network, 2007). Research has also indicated that preschool

experience can have a positive association with academic success (Bassok, 2010). However, little is known about how both the age at the start of school and preschool experience influence student achievement. Given that other leading nations in the academic domain provide education to their students in vastly different ways, it is possible that the developmentally focused strategies they are using could be applicable to our educational system to improve achievement and reduce frustration. In the next chapter, the methodology for this study will be discussed.

Chapter 3: Research Method

Introduction

As indicated in the review of the literature, the academic demands placed on young children today in the United States are very high, and these children are likely not developmentally ready for academic rigor when they begin school at age 5 years (Stipek, 2006). The purpose of this quantitative study was to assess if statistically significant differences exist in the reading achievement scores of children between those who begin kindergarten at an older age and those who begin kindergarten at a younger age. Further analysis also examined the relationship, if any, between the amount of preschool experience both of these groups of children have and reading achievement levels.

This chapter will justify the research design and approach. The chapter will also delineate the population of interest, sample selection procedures, operationalization of variables, and data analysis procedures. In addition, background information will be presented about the ex post facto data found in the Early Childhood Longitudinal Study (United States): Kindergarten Class of 1998-1999, Kindergarten-8th Grade Full Sample. The chapter will conclude with threats to validity, limitations of the research design, and ethical considerations.

Research Design and Rationale

This study utilized a quasiexperimental, quantitative research design following an ex post facto approach. Due to reading achievement scores being quantifiable measurements, a quantitative design was selected as the most appropriate method (Howell, 2010). A quasiexperimental design was selected due to nonrandom assignment

of groups. This eliminated the initial requirement of pure experimental studies, which stated that the sample must be randomly gathered and participants are manipulated to form a control and experimental group (Tabachnick & Fidell, 2012). An ex post facto research approach was applied by accessing archival data from school records.

A two-way analysis of variance (ANOVA) was used to assess differences in reading achievement in third grade students based on their age at the start of kindergarten and examining whether they had prior preschool experience. The independent variables corresponded to students' ages when starting kindergarten (young vs. old) and prior preschool experience (yes or no). The dependent variable corresponded to reading achievement scores in third grade.

Methodology

Population

The Early Childhood Longitudinal Study: Kindergarten Class of 1998-99, is a study that was supported by the United States Department of Education and included data from 21,260 students across the United States who entered kindergarten in the 1998-99 school year. This sample of students included boys and girls with a variety of ethnic backgrounds and socioeconomic statuses who entered kindergarten for the first time in the fall of 1998. The sample of students also included both private and public school students. Approximately 67% of the original students participated in the reading assessments when they were in the spring of their third grade school year.

The students who participated in this study were followed since they began kindergarten, and data were collected every couple of years on their school progress. The

study first began publishing data in 2003 when the kindergarten and 1st grade data were released. Data from third grade were released in 2005, fifth grade data were released in 2006, and the most recent eighth grade set were released in 2011, with additional data being published in 2013 and 2014.

Sampling and Sampling Procedures

All students who participated yearly in the longitudinal study from kindergarten through eighth grade were included in the study apart from those students who had missing data and those students who received special education services. Children entering kindergarten who were born between January and August of 1992 were in the older group (entry at age 6 years). Children entering kindergarten who were born between January and August of 1993 were in the younger group (entry at age 5 years). This age range was chosen because the typical birth date cut off for children to enter kindergarten is September 1st. Children receiving special education services were excluded from the study due to the confounding effects the additional services they received may have had on the study.

Minimum sample size and power analysis justification. Prior to implementing the sampling method selected for the study, there was a need to draw from a large pool of subjects for the statistical analysis – two-way ANOVA. The researcher planned to detect a medium effect size, $f = .25$ (Cohen, 1988). A generally accepted power of .80, and an alpha level of .05 were used. The alpha level of .05 assured that the researcher could be 95% certain that significant findings were not attributed to chance alone. Four groups were examined for the two-way ANOVA with one numerator degree of freedom.

Informed by the above delineated parameters, G*Power 3.1.9 determined that a sample of 128 participants would be sufficient to justify empirical validity. Given the sample size of 21,000 students in the archival data set, the minimum sample size requirement for the two-way ANOVA was easily obtained.

Procedures for Recruitment, Participation, and Data Collection

One of the goals for this research was to study the identified population without creating distress through questionnaires or interviews. Participants were not actively involved in the data collection because of the use of archival data. Because Walden University is a member of the Inter-University Consortium for Political and Social Research (ICPSR), the researcher was given access to the data set and no permissions were needed in order to utilize the data.

The Early Childhood Longitudinal Study collected data in a variety of formats during each of the data collection time periods. Upon entering the study, participants' parent(s) completed a parent interview to obtain background information about the participant. Participants also completed a variety of direct assessments at each of the data collection time periods, which included cognitive assessments that assessed academic achievement over time. Data were gathered from both sources for this research study. Data were extracted from the kindergarten class of 1998-1999 and reading achievement scores were organized for third grade. Each student was assigned a non-identifiable numerical code so scores could be matched.

Archival Data

The data utilized in this study were from the Early Childhood Longitudinal Study (United States): Kindergarten Class of 1998-1999, Kindergarten-8th Grade Full Sample. The data set was published by the United States Department of Education and is freely available from the Inter-University Consortium for Political and Social Research (ICPSR) at http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/28023. The Early Childhood Longitudinal Study utilized a multistage probability design to select a nationally representative sample of children attending kindergarten in the 1998-1999 school year.

Instrumentation and Operationalization of Constructs

Parent Interview

When participants were enrolled in the study, their parent(s) or caregiver(s) were asked to complete a parent interview. Interviews were conducted using either a computer-assisted telephone interview (CATI) or a computer-assisted personal interview (CAPI) for individuals who did not have a telephone. Questions related to family structure, childcare, education, household income, and child rearing practices were included in the interview. In most cases, the parent interview was conducted with the mother of the child. However, respondents could be a father, stepparent, adoptive parent, foster parent, grandparent, another relative, or a nonrelative guardian who was knowledgeable about the child. For this study, the researcher utilized demographic information from the parent interview including the child's gender, date of birth, and race along with whether or not the child attended preschool prior to beginning kindergarten. This was ascertained from the information gathered during the parent interview.

Direct Cognitive Assessment

The researchers utilized the term *direct cognitive assessment* throughout this study to identify assessments associated with cognition and academic performance. Even though the term direct cognitive assessment was used, it should be noted that for the purpose of this study, the academic achievement data derived from the assessments were used.

The direct cognitive assessments were designed to measure a child's knowledge at specific given points of time, and to track their academic growth over time in various subjects. The direct cognitive assessments were individually administered to children in the study in kindergarten, first grade, third grade, and fifth grade. Children were assessed individually and no time limits were utilized during the testing session. The examiner verbally asked the children the questions and the children then responded. The child's responses were then entered into the computer via the examiner.

To develop the direct cognitive assessments, the developers of the Early Childhood Longitudinal Study assessed academic skills that are typically taught at each grade level and identified those that are developmentally important. Test items were reviewed by curriculum and content area experts for appropriateness, level of difficulty, and content. Items that were selected were then field-tested and the validity of the final content of the direct cognitive assessments for third grade was established by comparing the results of the field test with the Woodcock-McGrew-Werder Mini Battery of Achievement (MBA). A correlation of .83 was found between the reading assessments on the MBA construct validation and on the direct cognitive assessments utilized for this study validating its usage.

The third grade reading portion of the direct cognitive assessments assessed four domain areas including phonemic awareness, word decoding, vocabulary (reading), and passage comprehension. In the phonemic awareness portion of the assessment, students were asked to identify sounds in words. In the word decoding section, students were asked to decode words and read them aloud. The words presented were easy at first, but became challenging as the student progressed. The vocabulary section asked students to define words used in sentences and passages. Lastly, the passage comprehension section provided students with passages to read to themselves and then they were asked questions about the passages. Students were given the reading portion of this assessment individually and their scores in each of the areas were converted to t-scores. The reliability of the third grade reading assessment was .94 (reliability of theta).

Data Analysis Plan

Data were uploaded into SPSS version 23.0 for Windows. Descriptive statistics were analyzed to describe the trends of the research variables. Frequencies and percentages were used for categorical (nominal) variables of interest. Descriptive statistics such as mean and standard deviation were calculated for continuous variables.

Pre-Analysis Data Screen

Outliers were examined by calculation of standardized values or z scores. Standardized values correspond to the number of standard deviations a data point fell from the mean. Data points that fell outside of the range $z = \pm 3.29$ standard deviations from the means were considered outlying responses, and were removed from further

analysis (Tabachnick & Fidell, 2012). Large portions of missing values were excluded from analysis.

Research Question One: Are there statistically significant differences in third graders' reading achievement scores by their age at the start of kindergarten?

$H_0$1: There are not statistically significant differences in third graders' reading achievement scores by their age at the start of kindergarten.

H_A1: There are statistically significant differences in third graders' reading achievement scores by their age at the start of kindergarten.

Research Question Two: Are there statistically significant differences in third graders' reading achievement scores by having prior preschool experience?

$H_0$2: There are not statistically significant differences in third graders' reading achievement scores by having prior preschool experience.

H_A2: There are statistically significant differences in third graders' reading achievement scores by having prior preschool experience.

Research Question Three: Does preschool experience moderate the relationship between age at the start of kindergarten and third graders' reading achievement scores?

$H_0$3: Preschool experience does not moderate the relationship between age at the start of kindergarten and third graders' reading achievement scores.

H_A3: Preschool experience does moderate the relationship between age at the start of kindergarten and third graders' reading achievement scores.

Two-Way Analysis of Variance (ANOVA)

To address the three research questions, a two-way analysis of variance (ANOVA) was conducted to determine if there is a statistically significant difference in reading achievement scores by age at the start of kindergarten and having prior preschool experience. In addition, preschool experience was examined as a potential moderating factor on the relationship between age at the start kindergarten and third graders' reading achievement scores. A two-way ANOVA is an appropriate statistical analysis when the goal of the research is to assess whether significant differences exist on multiple continuous dependent variables between two independent grouping variables (Tabachnick & Fidell, 2012). The independent grouping variables in this analysis corresponded to age of starting kindergarten (younger vs. older) and prior preschool experience (yes vs. no). To examine the moderating effect, an interaction term was examined for age of starting kindergarten and prior preschool experience. The continuous dependent variable corresponded to reading achievement scores for third graders.

Prior to conducting the two-way ANOVA, the assumptions of normality and homogeneity of variance were assessed. The assumption of normality checked that the reading achievement scores followed an approximate bell-shaped distribution, and were tested by the Kolmogorov-Smirnov tests (Tabachnick & Fidell, 2012). The homogeneity of variance assumption checked that the independent grouping variable had equal error variances. The assumption for homogeneity of variance was tested via Levene's test (Brace, Kemp, & Snelgar, 2006). The ANOVA is a robust statistical analysis in which violations of assumptions have relatively minor effects (Howell, 2010).

The ANOVA used the *F* test to make the overall comparison on whether group means differ. Two *F* tests were used to examine the effects on reading achievement scores of students' age at the start of kindergarten and prior preschool experience. One additional *F* test was used to examine the interaction effect of the two independent grouping variables. Significance was evaluated at $\alpha = .05$.

Threats to Internal Validity

Threats to internal validity correspond to the study procedures, experiences of participants, or treatment effects that hinder the ability of the researcher to collect inferences regarding the population of interest (Creswell, 2009). Within a quantitative study, research questions can be statistically analyzed. However, the underlying depth of participant's perceptions cannot be interpreted. Thus, the researcher traded this degree of richness for a level of statistical certainty that these findings did not occur by chance alone. The research did not involve random assignment to experimental or control groups, thus a true experimental design was not appropriate for the research. The division of participants into the independent groups was made without manipulation by the researcher.

Threats to External Validity

Threats to external validity correspond to confounding variables and bias in the selection of participants. Confounding variables may account for the strength of relationship among the variables of interest (Creswell, 2009). Factors such as socioeconomic status and ethnicity could affect the hypothesized relationships. A common limitation of research is inappropriately generalizing the findings to the

population of interest. The sample for the study was meant to be a national representative cohort of children. Because the data for kindergarteners was collected approximately 20 years ago, the statistical findings may not generalize to kindergarten children today.

Ethical Procedures

For research findings to be valid, the researcher must adhere to ethical standards when conducting research (Elliot, 2005). A researcher analyzing archival data has an inherent responsibility to safeguard the data (Bloomberg & Volpe, 2012). I followed the guidelines prescribed by the Institutional Review Board (IRB), and my study was approved by the IRB using the following reference number: 02-10-17-0089514. The following paragraphs outline the steps for data storage and destruction to protect participant's confidentiality. This study observed three ethical components corresponding to approval and privacy.

Approval

Prior to extracting and analyzing any data, the researcher sought permission and approval from Walden's University IRB committee. Permission to use the data was not needed since Walden University is a member of the ICPSR.

Privacy

Given that the data set was part of a national longitudinal study that was published, all names of participants were removed from the study. Participants were given a numerical code assigned to them that appeared in the survey output. The results of the data were protected on a password protected flash drive which will remain locked

in a filing cabinet in the researcher's residence. The data will remain on file for a period of five years and then will be deleted from the flash drive.

Summary

The purpose of this quantitative study was to assess if statistically significant differences exist in the reading achievement scores of children between those who begin kindergarten at an older age and those who begin kindergarten at a younger age. Further analysis also examined the relationship, if any, between the amount of preschool experience both of these groups of children have and achievement levels. This chapter identified and justified the selection of the quantitative, quasi-experimental research design through use of ex post facto data. This study utilized ex post facto data from The Early Childhood Longitudinal Study: Kindergarten Class of 1998-99. The data collection procedures and sampling techniques were outlined. The chapter included a data analysis plan to explain how the research questions were statistically addressed. A two-way ANOVA was used to answer the three research questions. The researcher strictly followed the procedures outlined in the data collection process and analysis of archival data and no harm befell upon those who participated in the data collection. Chapter 4 will provide the results of the data collection procedures and the research question will be statistically examined.

Chapter 4: Data Analysis

Introduction

The purpose of this quasiexperimental quantitative study utilizing ex post facto data was to assess if statistically significant differences exist in the reading achievement scores of children who begin kindergarten at an older age and those who begin kindergarten at a younger age. In further analysis I also examined whether the prior preschool experience both of these groups of children had was associated with reading achievement levels. The data utilized in this study were from the Early Childhood Longitudinal Study (United States): Kindergarten Class of 1998-1999, Kindergarten-8th Grade Full Sample. I explored descriptive statistics to look at the trends in the variables. I examined the nominal level variables through frequencies and percentages. The continuous level variables were examined through means and standard deviations. To address the research questions and hypotheses, a two-way ANOVA was used. To assess for significant findings, an alpha level of $\alpha = .05$ of was used.

Ex Post Facto Data Preanalysis

The entire sample of 21,109 students was entered into SPSS version 24.0 for Windows. I reduced the data to remove students within the exclusion criteria. Students with disabilities and students in special education were removed. In addition, only students who were 5 or 6 years old at the time of kindergarten were included. Children entering kindergarten who were born between January and August of 1992 were assigned to the older group (entry at age 6 years). Children entering kindergarten who were born between January and August of 1993 were assigned to the younger group (entry at age 5

years). Due to the low amount of 6 year olds in the sample, a random sample was conducted to even the distribution between 5 year olds and 6 year olds. Outliers were then examined for the third graders' reading achievement scores. Outliers were identified by scores falling outside of the threshold $\pm$ 3.29 standard deviations away from the mean (Tabachnick & Fidell, 2012). Only one student was removed due to an outlying low reading achievement score. The final sample size consisted of 292 participants.

Assumptions of a Two-Way ANOVA

Prior to analysis, the assumptions of the ANOVA were assessed. Normality of the dependent variable was checked with a Kolmogorov-Smirnov (KS) test. Levene's test was utilized to test the homogeneity of variance assumption.

Normality assumption. The results of the KS test were statistically significant for third graders' reading achievement scores (p = .001). Although the normality assumption was not met, the ANOVA is a robust test for stringent assumptions when the sample size is large ($n \geq 50$) (Stevens, 2009).

Homogeneity of variance assumption. Homogeneity of variance was checked with Levene's test and the results were not statistically significant (p = .542). Therefore, the homogeneity of variance assumption was met for third graders' reading achievement scores.

Participant Demographics

Frequencies and percentages of demographics. The distribution of participants was split between 143 males (49.0%) and 149 females (51.0%). A majority of the students were white (n = 231, 79.1%). The age of students entering kindergarten was

split between 5 year olds (n = 149, 51.0%) and 6 year olds (n = 143, 49.0%). A total of 138 participants (47.3%) had prior preschool experience, while 154 participants (52.7%) did not have prior preschool experience. The frequencies and percentages of the participants' demographic characteristics are presented in Table 1.

Table 1

Frequencies and Percentages of Demographic Characteristics

Demographic	*n*	%
Gender		
Male	143	49.0
Female	149	51.0
Race/Ethnicity		
White, non-Hispanic	231	79.1
Black or African American, non-Hispanic	14	4.8
Hispanic	27	9.2
Asian	10	3.4
Native Hawaiian or other Pacific Islander	1	0.3
American Indian or Alaska Native	3	1.0
More than one race	6	2.1
Age entering kindergarten		
Young (5 years old)	149	51.0
Old (6 years old)	143	49.0
Preschool experience		
Yes	138	47.3
No	154	52.7

Note. Due to rounding error, not all percentages may sum to 100.

Descriptive statistics of continuous variables. Means and standard deviations for third graders' reading achievement scores were examined. Standard scores on the reading achievement assessment ranged from 32.01 to 79.16, with M = 55.68 and SD = 7.21. The descriptive statistics for these variables are presented in Table 2.

Table 2

Descriptive Statistics of Continuous Variables

Continuous Variables	*Min.*	*Max.*	*M*	*SD*
Third graders' reading achievement scores	32.01	79.16	55.68	7.21

Research Questions and Hypothesis Testing

Three research questions addressed the relationships among kindergarten entrance age, preschool experience, and reading achievement. The first question assessed the relationship between age at the start of kindergarten and third graders' reading achievement performance. Question 2 addressed the relationship between prior preschool experience and third graders' reading achievement. Finally, the third question addressed whether prior preschool experience moderates the relationship between age at the start of kindergarten and third graders' reading achievement.

To address the research questions, a two-way ANOVA was conducted to determine if there is a statistically significant difference in reading achievement scores by age at the start of kindergarten and having prior preschool experience. The independent grouping variables in this analysis corresponded to age at the start of kindergarten (younger vs. older) and prior preschool experience (yes vs. no). The continuous dependent variables corresponded to reading achievement scores for third graders.

Research Question 1

Are there statistically significant differences in third graders' reading achievement scores by their age at the start of kindergarten?

$H_0$1: There are not statistically significant differences in third graders' reading achievement scores by their age at the start of kindergarten.

H_A1: There are statistically significant differences in third graders' reading achievement scores by their age at the start of kindergarten.

The results for the main effect of age group were statistically significant (F(1, 288) = 5.90, p = .016, partial η^2 = .020), suggesting that there were significant differences in third graders' reading achievement scores between the young and old age groups for starting kindergarten. The mean reading achievement standard scores for younger students (5 year olds) was 54.73 and for older students (6 year olds) the mean was 56.67. The data results of the two-way ANOVA are provided in Table 3 below. The null hypothesis ($H_0$1) for research question one was rejected.

Research Question 2

Are there statistically significant differences in third graders' reading achievement scores by having prior preschool experience?

$H_0$2: There are not statistically significant differences in third graders' reading achievement scores by having prior preschool experience.

H_A2: There are statistically significant differences in third graders' reading achievement scores by having prior preschool experience.

The results for the main effect of preschool experience were not statistically significant (F(1, 288) = 0.02, p = .881, partial η^2 = .000), suggesting that there were not significant differences in third graders' reading achievement scores between students who did and did not go to preschool. The mean reading achievement scores for students who

had preschool experience was 55.66 and for students who did not have preschool experience the mean was 55.70. The data results of the two-way ANOVA are provided in Table 3 below. The null hypothesis ($H_0$2) for research question two was not rejected.

Research Question 3

Does preschool experience moderate the relationship between age at the start of kindergarten and third graders' reading achievement scores?

$H_0$3: Preschool experience does not moderate the relationship between age at the start of kindergarten and third graders' reading achievement scores.

H_A3: Preschool experience does moderate the relationship between age at the start of kindergarten and third graders' reading achievement scores.

The results for the interaction effect of age group and preschool experience were not statistically significant ($F(1, 288) = 3.36$, $p = .068$, partial $\eta^2 = .012$), suggesting that preschool experience does not moderate the relationship between age at the start of kindergarten and third graders' reading achievement scores. The null hypothesis ($H_0$3) for research question three was not rejected. Table 3 presents the results of the two-way ANOVA. Table 4 presents the means and standard deviations of the third graders' reading achievement scores by age and preschool experience.

Table 3

Two-Way ANOVA for Third Graders' Reading Achievement Scores by Age and Preschool Experience

Source	*Df*	*SS*	*MS*	*F*	*p*	η^2
Age	1	300.45	300.45	5.90	.016	.020
Preschool Experience	1	1.15	1.15	0.02	.881	.000
Age*Preschool Experience	1	171.33	171.33	3.36	.068	.012
Error	288	14673.59	50.95			
Total	292	920330.32				

Table 4

Mean and Standard Deviations for Third Graders' Reading Achievement by Age and Preschool Experience

Age at time of kindergarten	Preschool Experience	Third Graders' Reading Achievement	
		M	*SD*
Young (5 years)	Preschool experience	54.03	6.79
	No preschool experience	55.44	7.98
	Total	54.73	7.41
Old (6 years)	Preschool experience	57.60	7.08
	No preschool experience	55.94	6.66
	Total	56.67	6.88
Total	Preschool experience	55.66	7.13
	No preschool experience	55.70	7.30
	Total	55.68	7.21

Summary

The purpose of this quantitative study was to assess if statistically significant differences exist in the reading achievement scores of children who begin kindergarten at an older age and those who begin kindergarten at a younger age. Further analysis also

examined if the prior preschool experience both of these groups of children had impacted reading achievement levels. This chapter presented the findings of the data collection and analyses. Frequencies and percentages were examined for nominal level variables. Means and standard deviations were examined for the continuous level variables. Results of the two-way ANOVA indicated that there were significant differences in third graders' reading achievement scores between the young and old age groups for starting kindergarten. Results of the two-way ANOVA indicated that there were not significant differences in third graders' reading achievement scores between students who did and did not go to preschool. Results of the two-way ANOVA indicated that preschool experience does not moderate the relationship between age at the start of kindergarten and third graders' reading achievement scores. The next chapter will provide an interpretation of the findings of this study and recommendations for future research.

Chapter 5: Discussion

Introduction

Young children and educators across the United States are subject to higher academic standards (Chiatovich & Stipek, 2016). While some children come to school ready to learn, others are not developmentally ready for the academic rigor that awaits them (Chiatovich & Stipek, 2016). Children participating in kindergarten programming in the United States are being held to academic standards that were previously set for older children and they are expected to master academic content at a younger age than previously expected. The purpose of this quasiexperimental quantitative study utilizing an ex-post facto approach was to assess if statistically significant differences exist in the reading achievement scores of children who begin kindergarten at an older age and those who begin kindergarten at a younger age. Further analysis also examined whether the prior preschool experience of both groups of children is associated with reading achievement levels.

The entire sample of 21,109 students from Early Childhood Longitudinal Study (United States): Kindergarten Class of 1998-1999, Kindergarten-8th Grade Full Sample was entered into SPSS and the data was then reduced to remove students within the exclusion criteria. A two-way ANOVA was used to analyze the data. Results of the two-way ANOVA indicated that there are significant differences in third graders' reading achievement scores between the young and old age groups for starting kindergarten. Students who began kindergarten at age 6 years outperformed students who began kindergarten at age 5 years on third grade reading achievement assessment. Results of

the two-way ANOVA also indicated that there are not significant differences in third graders' reading achievement scores between students who did and did not attend preschool, indicating that preschool did not appear to have an impact on reading achievement scores. Lastly, results of the two-way ANOVA indicated that preschool experience does not moderate the relationship between age at the start of kindergarten and third graders' reading achievement scores.

Interpretation of the Findings

The current study was based on the theory of cognitive development that was developed by Jean Piaget. This theory is centered around the belief that young children progress through developmental stages as they grow and develop (Piaget, 1964). Piaget believed that children's cognitive development matures out of the experiences they have within their environments. Children's thinking develops from the concrete, which focuses on playing within one's environment, to the abstract, which includes more advanced problem solving and creative thinking. Piaget's theory supports the use of play within early educational environments, because he believed that children under age 7 years learn best through play and interacting with their environment. Piaget also believed that children did not begin to develop problem solving and more complex thinking skills until around age 7 years. Therefore, this researcher ascertained that he would support starting children in formal schooling at an older age, closer to age 7 years.

The current study examined the relationships between kindergarten entrance age, preschool experience, and academic achievement. Many studies to date have found that beginning school at an older age is beneficial for students' academic achievement

(Crawford, Dearden, & Meghir, 2007; Gullo, 2014; Huang & Invernizzi, 2012; Lubotsky & Kaestner, 2016). Other studies have found that children who participate in preschool experience prior to beginning kindergarten are more likely to be successful academically then students who did not attend preschool (Barnett, 2011; Iruka & Morgan, 2014; Magnuson, Meyers, Ruhm, & Waldfogel, 2004; Votruba-Drzal, Coley, & Chase-Lansdale, 2004). However, little research has been done to examine the relationships between age at the start of kindergarten, preschool experience, and academic achievement, which this study targeted.

The first research question of this study examined the impact that age at the start of kindergarten had on reading achievement. The results of the study found that children who began kindergarten at the age of 6 years outperformed students who began kindergarten at age 5 years on third grade reading achievement assessments. This finding was consistent with Piaget's theory of cognitive development, as he believed that children would be better prepared for more complex cognitive processes closer to the age of 7 years. These findings were also consistent with the work of Lubotsky and Kaestner (2016) who found that children who enter kindergarten at an older age tend to do better on language arts and mathematical assessments than younger kindergarteners. Research from Gullo (2014) also found that children who began school at age 6 years performed better on academic achievement tests later on than children who started school at age 5 years.

The second research question of this study examined the impact that preschool experience has on reading achievement. The results of the study found that preschool

experience does not have a significant effect on reading achievement. This finding was rather surprising given that other researchers have found that high quality preschool programs have a significant impact on children's cognitive development and that can still be seen 10 years post preschool attendance (Bauchmüller, Gørtz, & Rasmussen, 2011). Votruba-Drzal, Coley, and Chase-Lansdale (2004) also found that the short-term effects of high quality early care and education programs include improved academic performance and achievement. Piaget's theory of cognitive development would support the use of preschool programming as preschool programming is focused on play, which Piaget believed was crucial to a child's cognitive development. It is possible that other confounding variables could have impacted the results and this will be addressed in the next section.

The final research question of this study examined whether preschool experience moderated the relationship between age at the start of kindergarten and third grade reading achievement. The results for the interaction effect of age group and preschool experience were not statistically significant suggesting that preschool experience does not moderate the relationship between age at the start of kindergarten and third graders' reading achievement scores. However, the effect was on the cusp of being significant. This was a surprising finding given that research has supported the notion that both preschool experience and age at the start of kindergarten have previously had a positive impact on academic achievement (Votruba-Drzal et al., 2004). It is also possible that other confounding variables impacted the results and this will be addressed in the next section.

Limitations of the Study

There were some limitations that impacted the current study. First, the study relied on longitudinal data that was collected over 20 years ago from across the United States. While many procedures were in place to collect data in the same way, it is possible that data collection procedures varied. Second, the data did not pass the KS test, which assessed the normality of the dependent variable. Thus, the normality assumption was not met. Although the normality assumption was not met through the KS test, the ANOVA is a robust test for stringent assumptions when the sample size is large ($n > 50$; Stevens, 2009). Third, when the sample was created, after removing students who did not match the study criteria, the group of students who were 6 years of age at the start of kindergarten was significantly smaller than the group of students who were 5 years of age at the start of kindergarten. Fourth, factors such as socioeconomic status or ethnicity could have been confounding variables that impacted the relationships. Fifth, data regarding student's participation in preschool were gathered via parent interviews and were not verified.

Recommendations

The results of this study rejected the null hypothesis that there are not statistically significant differences in third graders' reading achievement scores by their age at the start of kindergarten. The findings suggested that children who begin kindergarten at the age of 6 years outperform their younger peers on third grade reading achievement assessments. It is recommended that future studies examine how long age at the start of kindergarten impacts academic achievement. This would provide a better picture of how

the age at the start of kindergarten impacts student performance as they progress through grade levels.

The results of this study rejected the first null hypothesis that there are statistically significant differences in third graders' reading achievement scores by having prior preschool experience. These findings were surprising and suggested that preschool experience may not impact reading achievement. Given that the data utilized from this study was nearly 20 years old, updated research is suggested in this area. Early childhood programming has changed significantly and it is possible that the results may be different if examined based on today's early childhood programming. In addition, there were other factors that may have influenced children's achievement, such as a) parents may be teaching their children at home; b) more children are attending daycare, which often provides an educational environment similar to pre-school; and c) the use of technology-based learning programs at home.

The results of this study failed to reject the third null hypothesis that preschool experience moderates the relationship between age at the start of kindergarten and third graders' reading achievement scores. These findings were also surprising given that students who begin kindergarten at an older age and students who have prior preschool experience tend to perform better academically. This was surprising because when studied separately, the findings were significant, but when studied together they were found to be not significant. Given that the data used in this study was nearly 20 years old, new research examining how today's preschool experiences impact student achievement would be helpful. Thus, this researcher recommended further study to

understand the effect of school entrance age on academic success. Further research could serve to benefit children and enable them to experience greater academic success.

Implications

The goal of this study was to determine the relationship, if any, between age at the start of kindergarten, preschool experience, and reading achievement. Kindergarteners and teachers alike in the United States are facing significant frustration with higher academic demands and the reduction of developmentally appropriate practices. Research has shown that starting children in formal education at a younger age has no long-term benefit and may be detrimental to a child's learning overall (O'Connor & Angus, 2014). Starting school at an older age not only reduces frustration, but also has been shown to more effectively support a child's learning potential and increase their enjoyment of school (O'Connor & Angus, 2014). The results of this study supported the notion that children who begin school at the age of 6 years outperform their 5-year-old peers on third grade reading achievement assessment. However, preschool experience was not found to have a positive impact on third grade reading achievement. Given that age has been found to be a good predictor of reading performance, then this information should be disseminated to parents and teachers alike to assist them in making early childhood programming decisions to best support reading achievement success and reduce learning frustration in students. Instead of starting children in kindergarten at age 5 years, it is recommended that students wait until age 6 years to begin school. Several studies have found that delaying school entry will result in better academic success among students

(Crawford, Dearden, & Meghir, 2007; Gullo, 2014; Huang & Invernizzi, 2012; Lubotsky & Kaestner, 2016).

Conclusion

Children participating in kindergarten programming across the United States are expected to perform at a much higher level than in previous years. Many of these children are unprepared and developmentally not ready for the academic tasks that await them. Yet, we still push these children forward into school. Research has shown that children who are older at the start of kindergarten tend to perform better academically than their younger peers. Research has also shown that some children who attended preschool programming prior to the start of school tend to do better academically. What has been unknown though is whether both beginning kindergarten at an older age and attending preschool programing prior to the start of school will provide the support that all children need to be successful in school.

Piaget's theory of cognitive development was used as a foundation for this study. This study examined the relationships among age at the start of kindergarten, prior preschool experience, and academic achievement. A quantitative quasi-experimental methodology was utilized along with ex post facto data from the Early Childhood Longitudinal Study (United States): Kindergarten Class of 1998-1999. Data was analyzed using a 2-way ANOVA to assess for the strength of the associations among age at the start of kindergarten, prior preschool experience, and academic achievement.

The results of this study indicated that children who began kindergarten at age 6 years outperformed their younger peers on third grade reading achievement assessments.

However, prior preschool experience did not have a significant effect on performance. This study supported the notion that children who are older at the start of kindergarten are likely to perform better academically. Teachers and parents alike are encouraged to consider these findings when thinking about placing children in the kindergarten environment. Children are more likely to do better academically if they begin school at age 6 years, rather than age 5 years.

Studies like this one demonstrate the need for continued conversation about how variables like age at the start of school impact reading achievement and overall student success. This study examined only a couple of variables that impact academic achievement. Continued research should be conducted to study other variables that impact reading achievement. The more we can identify variables influencing student performance, the better we can support student success and improve future academic achievement outcomes.

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